

APRIL/MAY 2023

**GCH12/DCH12 — INORGANIC  
CHEMISTRY – I**

Time : Three hours

Maximum : 75 marks

**SECTION A — (10 × 2 = 20 marks)**

Answer ALL questions.

1. Distinguish between isopoly and heteropoly acids.
2. List any two uses of polymeric phosphazenes.
3. What are cubane clusters?
4. Define closoboranes.
5. Classify the following into 'Hard' and 'Soft' acids  
(a)  $\text{Mg}^{2+}$  (b)  $\text{Ti}^{4+}$  (c)  $\text{Cd}^{2+}$  (d)  $\text{Ag}^+$
6. The stability constant of  $[\text{Co}(\text{CN})_6]^{3-}$  in aqueous medium is much higher than that of  $[\text{Co}(\text{CN})_6]^{4-}$ . Justify.
7. The transform of  $[\text{M}(\text{aa})_2\text{bc}]$  does not show optical isomerism. Why?
8. Identify the terms 'fac' and 'catena' in the nomenclature of inorganic compounds.
9. Deduct the any two limitations of the Orgel diagram.
10. Predict the ground state term symbol for  $d^2$  ions.



SECTION B — ( $5 \times 5 = 25$  marks)

Answer ALL questions.

11. (a) Discuss about Organo phosphazenes.

Or

- (b) Illustrate the structure of silicates and their properties.

12. (a) What are metal cluster? Explain the basis of their classification.

Or

- (b) Describe an account on dinuclear metal cluster.

13. (a) Discuss stepwise stability constant and overall stability constant.

Or

- (b) How to determine the stability constant by spectrophotometric method.

14. (a) Write a note on the nomenclature of chiral complexes.

Or

- (b) Highlight on the structure of porphyrins and its uses.

15. (a) Write an account on the nephelauxetic effect.

Or

- (b) Discuss the spin-orbit coupling and its effects.

SECTION C — ( $3 \times 10 = 30$  marks)

Answer any THREE questions.

16. Explain salient structural features of the model proposed by Pauling and Keggin for the structure of a typical 12 hetero poly acid.

17. Enumerate the preparation and structure of carboranes.

18. Determine the factors affecting stability of complexes.

19. Discuss the principle and applications of ORD.

20. Develop the MO energy level diagram for  $[\text{Co}(\text{NH}_3)_6]^{3+}$  and explain it.